State of California
Department of Pesticide Regulation
Pesticide Registration Branch
PR-REG-003 (Est. 7/91) (Rev. 7/11)

APPLICATION
FOR SECTION 18 EMERGENCY EXEMPTION

The following information is required for an emergency exemption request based on the revised United States Environmental Protection Agency (USEPA) Code of Federal Regulations, Title 40, Part 166 concerning Section 18 requests. Requests which are incomplete will be denied by the USEPA without review. In order to comply with these requirements, the information listed below must be provided. **Use additional pages if necessary.** Please note that the more complete the questionnaire, the better your chances are of obtaining the exemption.

☐ **Check box if this is a reissuance request.** Year 2017 ID # EE-282054

TYPE OF EXEMPTION BEING REQUESTED (check one)

☒ SPECIFIC

☐ QUARANTINE

☐ PUBLIC HEALTH

DESCRIPTION OF PESTICIDE REQUESTED

Common Chemical Name (Active Ingredient): Sulfoxaflor

Trade Name/Brand Name: Transform WG

U.S. EPA Reg. No.: 62719-625

Formulation: Suspension Concentrate (SC) % Active Ingredient: 50.0%

Manufacturer: Dow AgroSciences

APPLICANT, STATE CONTACT PERSON, AND QUALIFIED EXPERT(S)

APPLICANT

Name:	Margaret Reiff
Title:	Environmental Program Manager I (Supervisory)
Organization:	CA Dept. of Pesticide Regulation (DPR)
Address:	1001 I Street, P.O. Box 4015
	Sacramento, CA 95812
Telephone:	916-445-5977
E-Mail:	Margaret.Reiff@cdpr.ca.gov
Signature:	Margaret Reiff
Date:	July 28, 2017

State Contact Person:	Francie Bishop
Telephone:	916-324-4251
E-Mail:	Francie.Bishop@cdpr.ca.gov
Fax:	916-324-5872

QUALIFIED EXPERT(S)

Name:	Roger Isom
Title:	President/CEO
Organization:	California Cotton Ginners and Growers Association
Address:	1785 N. Fine Ave Fresno, CA 93727
Telephone:	559-252-0684
E-Mail:	roger@ccgga.org

Name:	Robert Hutmacher, PhD
Title:	Extension Specialist and AES Agronomist – Cotton
Organization:	Center Director, Univ. CA West Side Research & Extension Center
Address:	17353 W. Oakland Ave Five Points, CA 93624
Telephone:	559-884-2411, Ext. 206
E-Mail:	rbhutmacher@ucdavis.edu

Name:	Peter Goodell, PhD
Title:	Cooperative Extension Advisor, IPM
Organization:	Kearney Agricultural Research & Extension Center
Address:	9240 S. Riverbend Ave. Parlier, CA 93648
Telephone:	559-646-6515
E-Mail:	pbgoodell@ucanr.edu

Name:	Brian Bret, PhD
Title:	Regulatory Manager
Organization:	Dow AgroSciences, LLC
Telephone:	916-780-7477
E-Mail:	blbret@dow.com

DESCRIPTION OF PROPOSED USE

Sites to be Treated (i.e. crops, structures, etc.): Cotton

Statewide or County Specific (list counties): Fresno, Glen, Imperial, Kern, Kings, Madera, Merced, Riverside, Sutter, Tehama, and Tulare Counties

Method of Application: Foliar applications made by air or ground

Rate of Application (in terms of a.i. and product):
Apply 1.5-2.25 ounces of product (0.047-0.071 lbs. a.i.) per acre per application

Frequency/Timing of Application: Use higher rate in the rate range for heavy pest populations. Two applications may be required for optimum tarnished plant bug control under high pest pressure or heavy immigration of plant bugs from other crops.

Applications may not begin before 7 pm and must be completed by 6 am.

Allow a minimum of 5 days between applications

Application Timing:
The thresholds explained below are guidelines to be used with square monitoring, depending on the particular weather patterns. The suggested thresholds are sliding thresholds (Anon, 2015). This refers to UC IPM PMGs.

Early Squaring (before 1st flower, until early June): >1 lygus bug/50 sweeps

Until June 15: <2 lygus bugs/50 sweeps

June 15-June 30: >2 lygus bugs/50 sweeps

Mid-Squaring (1st flower - 1st mature boll, beginning of July): 7-10 lygus bugs (at least 1 nymph) per 50 sweeps and expected or better fruit retention. If retention is higher than expected you may be able to wait and monitor again that week before making a treatment decision. If retention is lower than expected and lygus bugs are present, consider treating.

Late Squaring (after 1st mature boll): 10 lygus bugs/50 sweeps, including the presence of nymphs

Maximum Number of Applications: Two

Total Acreage Planted and to be Treated: 295,963 Planted
270,000 Treated

Total Amount of Pesticide to be used (in terms of product and a.i.):
75,937.5 pounds of Transform WG
37,968.8 pounds of Sulfoxaflor

Use Season:

Date first application needed: Crisis Section 18 (17CA05) authorized on July 21, 2017

Date last application needed: October 31, 2017

Restricted Entry Interval (REI): 24 hours

Preharvest Interval (PHI): 14 days

Earliest Harvest Date: October 1, 2017

Additional Restrictions, User Precautions and Requirements, Qualifications of Applicators, etc.:

- A copy of the Section 18 Use Instructions (label) must be in the possession of the user at the time of application in California (**Attachment A**).
- Follow all applicable restrictions, directions, and precautions on the U.S. EPA registered label for Transform WG Insecticide (**Attachment B**).
- The California Department of Pesticide Regulation (DPR) must be immediately informed of any adverse effects that may result from the use of Transform WG Insecticide in Cotton.
- Use of this product may pose a hazard to endangered or threatened species. Before applying this product, applicators must obtain information regarding the proximity of endangered species habitats and follow any applicable use limitations. Contact your County Agricultural Commissioner or refer to the Department of Pesticide Regulation's PRESCRIBE Internet Database: http://www.cdpr.ca.gov/docs/endspec/prescint.htm for details

EXPECTED RESIDUE LEVELS IN FOOD

Applications made in accordance with the terms of the emergency exemption issued under section 18 of FIFRA are not expected to result in residues of sulfoxaflor, including its metabolites and degradates, in or on cotton commodities in excess of the following USEPA previously established tolerances listed in the 40 CFR at 180.668:

Cotton, gin by products:	6.00 ppm
Cotton, hulls:	0.35 ppm
Cottonseed:	0.20 ppm

ALTERNATIVE METHODS OF CONTROL

While registered materials do work under low to moderate pressure, the huge population densities being experienced in 2017 are exceptional. Populations have overwhelmed alternatives. Many products such as Steward (indoxacarb), Diamond (novaluron), and Belay (clothianidin) suppress populations (60% control), which is acceptable at low populations (5-10 Lygus bugs per 50 sweeps). However, after treatment with the available alternative pesticides, Lygus population densities are still well above economic threshold (20-30 per 50 sweeps).

For the 2017 season, the Lygus populations found in cotton during its initial fruit development was 10-30 times over the treatment levels. Treating with pyrethroids and organophosphates reduced the population but continued movement of Lygus bugs into the fields returned the population levels back to high counts (20-40 bugs per 50 sweeps) within a week. Additional treatments were made, but damage is severe during the periods of high infestation (50-70% loss of production).

Figure 1 Lygus population after fifth insecticide application

California is unique in its production of specialty crops which border cotton, and these specialty crops require substantially more farm laborers. The use of some of the products has generated public concern for the safety of these workers and the environment; as a result, cotton producers would prefer to use reduced risk products such as Belay and Carbine. However, Belay (clothianidin) is not available for use after cotton blooms (early July). While Carbine (flonicamid) is an excellent choice for efficacy and selectivity, reliance on a single active ingredient puts undue selection pressure on the Lygus population. Additionally, utilizing Carbine is met with the restriction of a limitation to three applications per season and some growers have already gone through their second application.

The use of pyrethroids and organophosphates increase the risk to the environment and human exposure. Heavy use of chlorpyrifos and dimethoate can cause water quality exceedances, and pyrethroids can cause sediment contamination.

On top of having increased risks for the environment and public health, pyrethroids are losing their effectiveness on Lygus bugs due to resistance development. Research done by the late Dr. Larry Godfrey, University of California, Davis Entomologist, has shown that multiple applications increase resistance in subsequent Lygus populations.

Furthermore, the UC IPM website explains that populations of Lygus bugs from cotton, alfalfa hay, and alfalfa seed have developed resistance to certain organophosphate, carbamate, and pyrethroid insecticides. Pyrethroids resistance increased significantly in the late 1990s, shortening the residual period for lygus bug control following an application. In order to manage resistance in Lygus bugs, the IPM guidelines recommend spraying as few times as possible and rotate between insecticides with a different mode-of-action. Additionally, it is critical to keep in mind that sprays applied for other pests such as aphids can also impact resistance selection for secondary Lygus populations. As a result, applications made for aphid control will need to be considered in a rotation scheme when selecting an insecticide for lygus bugs. (UC IPM Website)

Registered Alternative Pesticides:

Flonicamid: While Carbine (flonicamid) is an excellent choice for efficacy and selectivity, reliance on a single active ingredient puts undue selection pressure on the Lygus population. Additionally, utilizing Carbine is met with the restriction of three applications per season and some growers have already gone through their second application.

Indoxacarb: Indoxacarb is not considered for heavy infestations because it only suppresses the Lygus populations by 60-70%. Under normal circumstances, during early fruit set, the decision threshold for pesticide treatment is 1-4 Lygus Bugs per 50 sweeps. Indoxacarb is useful at normal levels but at 30 Lygus per 50 sweeps, after treatment, growers are still seeing 20-30 Lygus bugs per 50 sweeps.

Oxamyl: Growers recently lost the use of Vydate (oxamyl) due to a disruption in supply chain. Vydate was a key product for managing resident nymph populations versus migratory adults. This is critical partly because nymphs are more voracious feeders and tend to cause the most severe damage. Oxamyl can knock down resident nymph populations by 91% even under heavy pressure. CDPR confirmed availability issues with E.I. Du Pont De Nemours and Company on July 27, 2017.

Imidacloprid + Beta-Cyfluthrin: This pre-mix insecticide is used against low to moderate population densities to knockdown adult Lygus bugs and to suppress potential aphid flare-ups. PCAs have reported reduced efficacy in controlling Lygus when a second application is made. The lack of efficacy with repeated applications has been demonstrated in unpublished resistance studies performed by the late Dr. Larry Godfrey, University of California, Davis Entomologist. Pyrethroids are broad spectrum insecticides and multiple applications in individual fields have resulted in secondary outbreaks of aphids and mites due to a reduction in natural enemies. Furthermore, pyrethroids are continuously evaluated by DPR for sediment runoff into surface water, and are currently under ecological review at the U.S. EPA.

Bifenthrin: PCAs have reported reduced efficacy in controlling Lygus with pyrethroids second use. Unpublished resistance studies indicate that Lygus possibly gain an increased tolerance to pyrethroids depending on use patterns. Furthermore, Pyrethroids are highly toxic to bees. Pyrethroid use is limited to 3 applications per season and requires highest application rate in arid environments and during heavy lygus pressure. Pyrethroids are broad spectrum insecticides and multiple applications in individual fields have resulted in secondary outbreaks of aphids and mites due to a reduction in natural enemies. Furthermore, pyrethroids are continuously evaluated by DPR for sediment runoff into surface water, and are currently under ecological review at the U.S. EPA.

Zeta-Cypermethrin: PCAs have reported reduced efficacy in controlling Lygus with pyrethroids second use. Unpublished resistance studies indicate that Lygus possibly gain an increased tolerance to pyrethroids depending on use patterns. Furthermore, Pyrethroids are highly toxic to bees. Pyrethroid use is limited to 3 applications per season and requires highest application rate in arid environments and during heavy lygus pressure. Pyrethroids are broad spectrum insecticides and multiple applications in individual fields have resulted in secondary outbreaks of aphids and mites due to a reduction in natural enemies. Furthermore, pyrethroids are continuously evaluated by DPR for sediment runoff into surface water, and are currently under ecological review at the U.S. EPA.

Lambda-Cyhalothrin: PCAs have reported reduced efficacy in controlling Lygus with pyrethroids second use. Unpublished resistance studies indicate that Lygus possibly gain an increased tolerance to pyrethroids depending on use patterns. Furthermore, Pyrethroids are highly toxic to bees. Pyrethroid use is limited to 3 applications per season and requires highest application rate in arid environments and during heavy lygus pressure. Pyrethroids are broad spectrum insecticides and multiple applications in individual fields have resulted in secondary outbreaks of aphids and mites due to a reduction in natural enemies. Furthermore, pyrethroids are continuously evaluated by DPR for sediment runoff into surface water, and are currently under ecological review at the U.S. EPA. Lambda-Cyhalothrin shares mode of action group number with multiple materials such as Imidacloprid-beta cyfluthrin, bifenthrin, Beta-cyfluthrin, and Lambda–cyhalothrin.

Novaluron: Diamond (novaluron) can suppress populations by 60% which is acceptable at low populations (5-10/50 sweeps). However, with the current infestations, after treatment with Diamond, Lygus population densities are still well above economic threshold (20-30 Lygus bugs per 50 sweeps).

Dimethoate: This organophosphate is often used as a tank-mix with Pyrethroids to aid in insecticide resistance management. Dimethoate is usually avoided due to the worker reentry interval of 48 hours. This material also tends to be non-selective and when used during early-season through mid-season, the chemical can be hard on beneficial insects in cotton. As a result, use of dimethoate is often associated with spider mite outbreaks. Dimethoate is limited to two applications per season. Organophosphates are highly toxic to bees.

Acephate: This organophosphate is not widely used under normal Lygus conditions due to its broad spectrum and association with spider mite outbreaks. This active ingredient has good activity but has been widely used against Lygus for over 30 years. Resistance has been reported in Arizona. Organophosphates are highly toxic to bees.

Clothianidin: Provides good efficacy against Lygus; however, growers will not be able to use it after first bloom which is anticipated to occur in early July. Furthermore, the product may induce outbreaks of spider mites.

UC IPM Ranking	Product	MoA	Selectivity	Predatory mites	General predators	Parasites	Honey bees	Duration of impact to natural enemies	Comments
1	flonicamid - Carbine	9C	narrow	L	L	L	III	short	Good control, no knockdown, excellent on nymphs
2	indoxacarb - Steward	22A	narrow	—	L	L	I	moderate	Suppression, not control
3	~~oxamyl - Vydate~~	~~1A~~	~~broad~~	~~H~~	~~H~~	~~H~~	~~I~~	~~moderate~~	Not available
4	imidacloprid + beta-cyfluthrin - Leverage	4A/3A	—	—	—	—	—	—	Pollinator risk, resistance developing
5	bifenthrin - Brigade	3A	broad	H	H	H	I	long	Pollinator risk, resistance developing
6	beta-cyfluthrin - Baythroid	3A	broad	H	H	H	I	moderate	Pollinator risk, resistance developing
7	zeta-cypermethrin Mustang	3A	broad	H	M/H	M/H	I	moderate	Pollinator risk, resistance developing
8	lambda-cyhalothrin - Warrior	3A	broad	H	H	H	I	moderate	Pollinator risk, resistance developing
9	novaluron - Diamond	15	narrow	L	L	__	I	short	Suppression, not control
10	dimethoate	1B	broad	H	H	H	I	long	Broad spectrum, natural enemy impact
11	acephate -Orthene	1B	broad	H	H	M/H	I	moderate	Broad spectrum, natural enemy impact
12	clothiandin -Belay	4A	--	--	M/H	M/H	I	unknown	Cannot be used after first bloom, impacts natural enemies, spider mite resurgence reported

The late Dr. Larry Godfrey conducted annual efficacy trials. These bullet points are extracted from annual summaries reported to Cotton Incorporated State Support Committee:

- 2012 Summary:
  - High Lygus densities (34/50 sweeps)
  - July application Vydate reduced population by 91%; Belay, Vydate, and Transform (2.25 oz.) were significantly lower than in the untreated
  - August application: Transform, Vydate, Carbine still provided a significant reduction in numbers.
  - For nymphs, Transform, Carbine, Belay, and Vydate performed the best
  - The registered standards, Carbine, Vydate, and Belay generally performed well for lygus bug management. Transform, nearing registration, generally showed good lygus control
  - The pyrethroid products are known to be fairly damaging to populations and this was again shown. Transform was generally fairly easy on beneficials but again there were cases where some impacts were seen. Carbine was generally fairly easy on populations of beneficial

- 2013 summary
  - Pyrethroid insecticides are still used but in recent years there has been a definite degradation in activity, due to resistance development, against lygus for this class of chemistry so now perhaps one application per season can be effectively used
  - The registered standards, Carbine, Vydate, and Belay performed well for lygus bug management. Transform, nearing registration, generally showed good lygus control although it appears the higher rate (2.25 oz.) is needed.
  - Vydate, Beleaf increased yields by 20% and Carbine, Transform (2.25 oz.), and Leverage increased yields by 10%.

- 2014 summary
  - There is a level of resistance to pyrethroids in SJV lygus bugs; multiple applications increase resistance in subsequent populations
  - Seed cotton yield was highest the Carbine, Vydate, treatments at over 3000 lbs./A. These values were significantly higher than all the other 14 treatments.
  - For nymph control, Transform, Carbine, Belay, and Vydate rose to the top.
  - Several products performed well in spite of the high pressure. Belay, Vydate, and Carbine also provided good adult lygus control
  - Effects on natural enemies were greatest from Belay and the pyrethroids.

- 2015 Summary
  - Vydate, Transform and Vydate + Warrior were the most effective treatments when looking at the overall population. Concentrating only on nymphs, the Transform and Carbine were also effective.
  - Effects on natural enemies were greatest with Belay and pyrethroid treatments (alone or in combination).
  - Cotton yield reflected the lygus bug control with Carbine, Vydate, and Vydate + Warrior having the highest yields. Yield loss compared with that in the untreated was up to 45%.
  - Overall, the resistance values for Capture, Vydate, and Belay were about 50% higher in 2015 than in 2014.

- 2016 Summary
  - A comparison of several registered and experimental insecticides to a moderate to high lygus bug population was conducted. Diamond, Orthene, Vydate, and Carbine were among the most effective treatments on lygus bug nymphs.
  - Eleven of the fifteen insecticide treatments showed a significant yield increase, compared with the untreated including Belay, Transform, Carbine, and Vydate but not so with several pyrethroids
  - Resistance levels to pyrethroids, carbamates, and OPs were less compared to 2015 but still present and expected to increase if repeated applications are required.

Alternative Control Practices:

Lygus bugs migrate to cotton fields from other hosts; as a result, area wide management is an important approach to managing Lygus bugs before they move into cotton (Goodell et al, 2012; Carriere et al, 2012). It is critical to assess the Lygus population outside of the cotton field. The IPM Guidelines suggest checking weeds surrounding cotton fields, nearby alfalfa fields and other nearby crops (UC IPM Pest Management website).

Weed management when possible is utilized as a way to help mitigate Lygus pest pressures. However, more often than not, the weed management needed to help suppress Lygus populations is out of the hands of the grower experiencing the pest pressures. Areas surrounding cotton fields including right of ways, highways, or "natural areas" are overseen by respective county, state or federal agencies, not the growers. It is simply not economically justifiable for county agencies to spend the manpower and fuel to manage areas on a case-by-case instance relative to cotton producing areas (Pete Goodell, UC Cooperative Extension Advisor).

In addition, from lack of water availability due to the long term drought California experienced, several fields remained fallow. Fallowed fields that have become overgrown or weedy are often not managed by the same grower who is experiencing the Lygus pest pressure in cotton. Some growers encountering this issue have taken steps against neighboring operations with a weed management problem seeking action to mitigate the problem. However, with the extent of land and weeds present, the management required would take too long and extend past the cotton growing season. These growers who have fallowed fields are already taking an economic hit by having that land out of production. Once again, it is not economically sound to spend the time, fuel, and labor plowing a field with no foreseeable revenue (Pete Goodell, UC Cooperative Extension Advisor).

From the UC IPM's website, other crops are more attractive to lygus bugs than cotton. These crops include alfalfa, safflower, sugarbeet, tomato, beans, and potatoes. As these crops are prepared for harvest, adult Lygus migrate out of the field in search of new hosts. Careful management of these crops can reduce the migration of lygus bugs into cotton fields during cotton's most vulnerable period, mid-May through late July, and later in the season when bolls are present.

Alfalfa is a preferred host for lygus bugs; as result, management of alfalfa hay can aid in preventing movement of the Lygus bugs into cotton fields. Leaving small, uncut alfalfa strips at each harvest, provides essential refugia for natural enemies. Growers who practice the strip cutting in alfalfa and safflower (proven practices to assist with lygus management in cotton) are often also growers of cotton; when this practice is available it is utilized.

Biological Control:
The repeated use of broad spectrum insecticides (organophosphates, pyrethroids, and neonicotinoids) has affected the IPM system through the reduction of natural enemies including bigeyed bugs, minute pirate bugs, parasitic wasps, and other general predators. Conservation of natural enemies is the basis for biological control in cotton. When multiple broad spectrum insecticides are required to manage a large influx of Lygus bugs, the inventory of natural enemies, the "biological residue", is removed. As a result, the population of Lygus and other pests (aphid, mites, and whiteflies) continue to grow.

Monitoring and Treatment Decisions:
For treatment decisions, fruit retention as well as the results of sweep net samples should be considered. Lygus bug decision thresholds are variable through the production season. For example, early in the season when the plant is most susceptible and consequences are greater for later management, fewer insects will trigger a treatment while as the season progresses and fruit is set on the plant, a much higher population will trigger a treatment (Johnson-Hake, 1995).

Additionally, duration of fruit retention may vary according to the cotton cultivar present in the field. The longer the fruit is retained, the longer it will be attractive to lygus bug populations. Finally, success in retaining early squares will greatly determine the final yield; therefore protecting cotton during the early square formation period (June) is critical. Protection during the early season is very complex. Factors such as low lygus bug numbers, high susceptibility of cotton, and variability in sampling require the grower to be extremely vigilant and ready to act at an instant. Failure to adequately protect cotton during this time period results in an even greater need to protect remaining cotton through the rest of the season.

Figure 2 Sweeping cotton for Lygus.

Integrated Pest Management:
Unique to the California system has been a long commitment of linking Lygus bug densities (as measured by a standard sweep net over 50 paces or sweeps) to cotton plant based metrics.
Pete Goodell, an Integrated Pest Management Advisor located in Fresno County, has been working in improving and expanding IPM in cotton. Working with several cotton agronomy colleagues and the cotton and allied industries, together they have developed evaluation and risk assessment tools which link the pest and the plant for a dynamic decision support system. Their goal has always been to produce a profitable yield and the highest quality lint while protecting the environment, people, pollinators, and cotton's inventory of natural enemies.

Most recently, a "Decision Support Tool" has been developed which provides easy access to the information and details of managing Lygus bugs in an IPM framework. The framework provides an IDEAL IPM approach by identifying the pest, determining the population level, and availability of natural enemies while evaluating risk to the crop.

The Cotton IPM approach is built around the constraints of the production system, including water restrictions, nitrogen groundwater concerns, early harvest to avoid late season pests, and weather conditions that impact the quality of the lint. To produce high quality cotton and to protect the quality from contamination (e.g. late season honeydew), growers seek the shortest possible production time to avoid excessive costs and expensive water usage. Loss of fruit early requires compensation by the plant to replace potential bolls. In the high cost environment of California, growers must strive to attain high yields to cover the land, labor, water and input costs. Loss of yield impacts directly their ability to stay competitive as does the high cost of repeated insecticide applications for Lygus and subsequent insects released by the use of broad spectrum insecticides.

EFFICACY OF USE PROPOSED UNDER SECTION 18

Sulfoxaflor is a part of the sulfoximines class of chemicals and is highly specific for sap-feeding insect pests. Sulfoxaflor is registered federally on several crops including canola (rapeseed) (subgroup 20A), root and tuber vegetables (crop groups 1A and 1B), potatoes (crop groups 1C and 1D), succulent, triticale, and wheat. Sulfoxaflor has been proven to be efficacious on Lygus bugs. DPR entomologists support the use of Sulfoxaflor on cotton based on data previously evaluated from use of the product on cotton and other similar crops.

DPR's review of this efficacy data is submitted in **Attachment C**.

COORDINATION WITH OTHER AFFECTED FEDERAL, STATE, and LOCAL AGENCIES

The appropriate state agencies are also being notified of this specific exemption request through routine weekly notices which the Department of Pesticide Regulation distributes. Comments received after the submission of this request will be forwarded to U.S. EPA.

NOTIFICATION OF REGISTRANT

The registrant of Transform WG, Dow AgroSciences, has provided a letter of support for the proposed emergency use (**Attachment D**).

REPEAT USES
(Interim Use Report)

Not applicable. This is a first time new use in California.

PROGRESS TOWARDS REGISTRATION

(Information from registrant concerning the current status)
(Not required for request of a Quarantine Exemption)
(Check All That Apply)

[X] NO APPLICATION FOR REGISTRATION OF THE USE IS UNDER REVIEW BY USEPA.

While there is no Section 3 registration for Transform on cotton, Dow AgroSciences remains engaged with US EPA to approve this use on the section 3 label. However, it should be noted that for cotton growers, the approval is not anticipated to occur in the 2017 season.

[ ] USEPA IS REVIEWING AN APPLICATION FOR REGISTRATION OF THIS USE (TYPE OF REGISTRATION __).

[ ] AN IR-4 PETITION FOR TOLERANCE IS BEING DEVELOPED: PETITION

[ ] A PETITION FOR TOLERANCE HAS BEEN SUBMITTED TO USEPA BY THE MANUFACTURER. PETITION # _____________.

[ ] A PETITION FOR TOLERANCE OR AN APPLICATION FOR REGISTRATION HAS BEEN DENIED (INDICATE THE CIRCUMSTANCES ____).

IF THIS USE PATTERN WILL BE NEEDED FOR MORE THAN ONE SEASON, A PERMANENT TOLERANCE SHOULD BE PURSUED IMMEDIATELY. CONTACT THE MANUFACTURER OR IR-4 TO INITIATE THE ESTABLISHMENT OF A PERMANENT TOLERANCE

NAME OF PEST

Scientific Name: *Lygus spp.*
Common Name: Western Tarnished Plant Bug (Lygus Bug)

Figure 3 *Lygus hesperus* male (left) and female on a cotton leaf

Adult Lygus bugs are sap sucking insects that are about 0.25 inches long and vary in color, from pale green to yellowish brown. Lygus adults are winged and very mobile making them highly capable of flying from host to host.

Overwintered lygus bugs lay eggs in weeds in January, and in March eggs began to hatch. Weeds such as clovers, vetches and mustards are usually the preferred host for Lygus bugs; however, once the weeds die back, the adult lygus bugs move into nearby crop fields, including cotton. Once in the cotton fields, female adults begin to lay eggs inserting them into the plant tissue, usually in the leaf petioles of the cotton plant. Depending on temperature, the eggs will hatch anywhere from 6-14 days. Nymph's wings are not developed; however, nymphs are capable of moving quickly making them difficult to detect in cotton foliage. Immature Lygus nymphs are particularly damaging as they remain on a plant and cause concentrated damage. Lygus will go through 5 nymphal instars before molting to an adult, which usually takes 10 to 15 days.

Lygus spp. (Lygus Bug) is a key pest infesting the cotton production system in California. Lygus bugs can threaten a cotton crop from earliest fruit set through flowering to final boll set. Lygus bugs damage the cotton by inserting their mouthparts into important developing plant tissues. For instance, when feeding on squares (flower buds), the Lygus target the developing anthers and other essential plant tissue. The damage done depends on the size of the square. When squares are small, they shrivel, turn brown, and drop from the plant. Losing the early fruit sets (squares) causes delays in plant development; as a result, more time is required for the plant to compensate resulting in an extension in the time to harvest. For larger squares, they remain on the plant but flowers tend to develop with blackened, shriveled anthers incapable of producing pollen, thus interfering with fertilization. Lygus will also feed on the meristematic, or the growing tip of the plant, causing the plant to develop multiple growing points, which creates a bushy plant. Instead of using energy to set fruit, the plant uses energy to grow new vegetation which results in a further reduction of yield.

Currently, growers have reported and observed square retention of 50% and in some cases, even lower. Under routine circumstances, early in the season, typical fruit retention should be around 73%. In previous years when Lygus population densities reached critically high levels, cotton production was reduced in ranges from 17% to 37%. Failure to adequately protect cotton during early square formation results in an even greater need to protect remaining cotton through the rest of the season. (Pete Goodell, UC Cooperative Extension Advisor)

Furthermore, Lygus bugs will feed on the bolls, targeting the developing seeds. If the Lygus penetrates the carpal wall of the boll, economic damage will occur. If the feeding is extensive, the boll falls off the plant. If the damaged bolls remain, the boll will have undeveloped seeds resulting in reduced lint production. The damage done to the developing bolls further increases the loss in yield and profit of the crop.

In Figure 4, the photo shows cotton plants collected on July 20, 2017. The leaves have been stripped to highlight the fruiting pattern. All three plants are from fields with similar planting dates, but experiencing different levels of lygus pressure. The center plant illustrates damage being seen in 90% of the fields impacted by lygus, and the photo displays the severe feeding damage. The plant dropped several of the developing fruit buds which ultimately results in reduced cotton yield. The plant on the right illustrates a plant from a field with early, light lygus feeding. This is what most of the growers would expect to see under normal lygus pressure. The plant on the left was from field that experienced an early lygus infestation that was adequately controlled with available pesticides, and the field did not experience the constant pressure several other fields are experiencing. Please note for the plant on the left, the absence of fruit load on the lower one third of the plant where the lygus fed. The plant recovered, but had to use additional energy to create new growth.

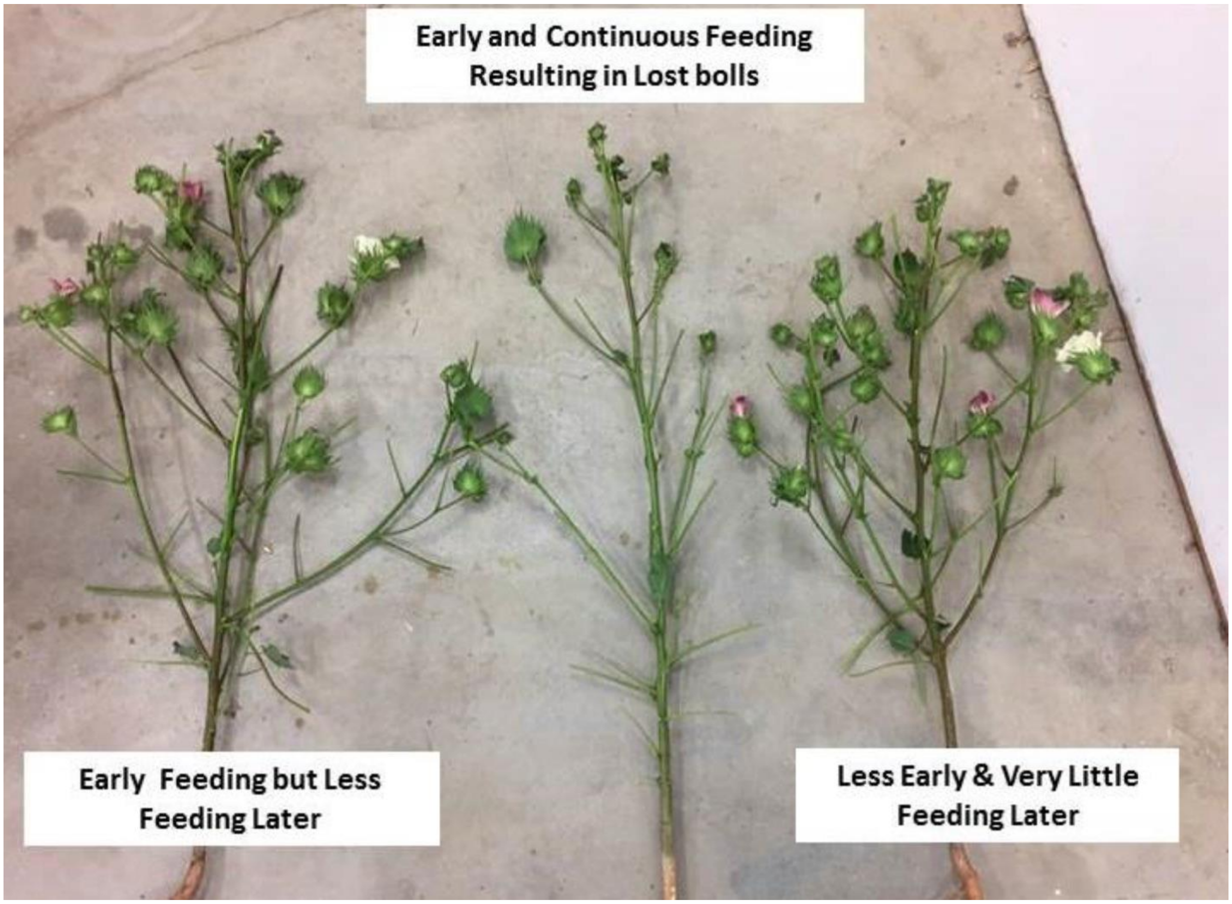


Figure 4 Cotton Plants with various lygus damage. Photo by R. Hutmacher.

The specific exemption request is necessary to further avert significant losses by the California cotton industry. Because several growers have experienced severe damage to the majority of the early crop, protecting the late season crop is critical in order for the growers to have a chance to obtain economic success. Growers will still continue to experience high Lygus pressure because lygus are polyphagous mirid insects. Essentially, many weeds and cultivated crops can act as hosts for Lygus bugs allowing the population to build exponentially. California has a large diversity of specialty crops that can act as hosts for lygus bugs. The harvest period of the bordering specialty crops can impact cotton anytime during the months of May through September. Late season infestations can destroy not only squares, but small bolls as well. In a year like 2017, the late fruits are the only hope a grower has in making even a small crop.

DISCUSSION OF EVENTS OR CIRCUMSTANCES WHICH BROUGHT ABOUT THE EMERGENCY CONDITION

Lygus bug populations overwinter as pre-sexual adults. They emerge in winter, find suitable hosts, mature, and reproduce. In certain years, weather patterns provide ideal conditions for a large spring buildup. These conditions include early, frequent, and extended rainfall patterns and temperatures warm enough to allow for development (50◦ F or greater). These are the conditions that have allowed a large Lygus bug population to develop in weedy and abandoned fields (untended due to prolonged drought) and weedy right of ways. These wild hosts dry down in late May and early June, releasing the population into neighboring fields. Cotton is especially susceptible at this point and large infestations can destroy fruit as soon as it is developed.

The California cotton industry is experiencing an unprecedented infestation of Lygus bugs. Current Lygus counts are massive compared to typical years. According to the California Cotton Ginners and Growers Association, 90% of cotton acreage in the impacted counties, or roughly 270,000 acres of cotton, will need to be treated to control Lygus bugs. In normal years, some Lygus always appear in cotton fields in June. However, the populations are relatively low in density and do not continually re-infest. As a result, growers are able to control the Lygus population with currently registered insecticides. Under typical conditions, 1-4 Lygus/50 sweeps (measured using a standard sweep net over 50 paces or sweeps) is the threshold for the grower to take action to control the Lygus population. Under current conditions, growers are seeing 20-50 lygus per 50 sweeps, well beyond the treatment threshold. Due to the immense, continued pest pressure, currently registered pesticides are not able to provide adequate control. The timing of the infestation and the growth stage of the cotton is now critical and will result in 20% or more yield losses in affected areas.

The emergency exists because natural conditions created overwhelming Lygus infestations, requiring repeated applications of broad spectrum insecticides. The cotton industry is experiencing continued, intense pressure from Lygus bugs due to the recent wet, extended winter. Due to heavy winter rains and the extended period of rainfall, the weed population in areas surrounding cotton fields (right of ways, highways, and natural areas) was able to thrive. Consequently, the weed population remained a viable host for Lygus for a prolonged period during March to May. Furthermore, due to the recent drought in California, several large fields were left uncultivated allowing for a dense population of weeds to develop, which further increased the Lygus population. The increased weed population allowed the Lygus population to surge, and as the weeds began to die back, a massive population of Lygus bugs moved into surrounding cotton fields.

The Lygus infestation being experienced in geographically differing areas is a result of the entire state experiencing increased precipitation and an extended winter this year. This increased precipitation resulted in increased weedy areas in the surrounding foothills along with increased growth in unmanaged areas as noted above. Where weed management is possible, and within the grower's control, action is being taken. However, the overall weed growth throughout the entire state creates an environment in which the weed management needed is not feasible or cost effective. Furthermore, the time and effort required to maintain the extensive weed growth would not be completed in time to address the present issue.

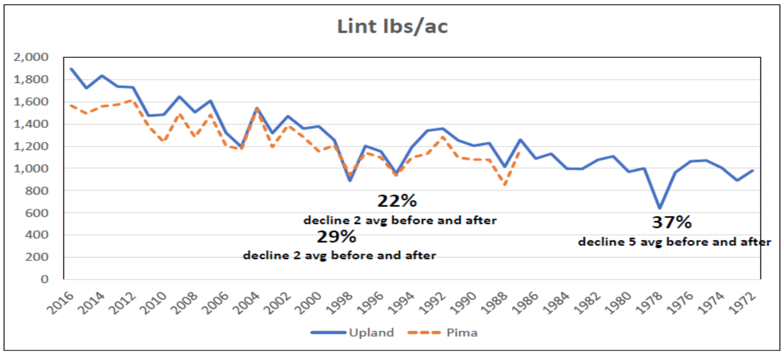
Currently, several growers are already on their 4th application of pesticide for treating Lygus and are still receiving upwards of 30 counts (4 times over the action threshold). Multiple applications of tank mixes to control these high population densities are setting the stage for other pest outbreaks including spider mites, aphids and whiteflies. Furthermore, the repeated use of several active ingredients does not support accepted insecticide resistance management principles.

The California Cotton Ginners and Growers Association explained the infestation is so bad for one grower that he was advised to disk the field. Due to the intensity of the infestation, the cotton plants will not recover from the damage done by the Lygus bugs. As a result, the grower will not be able to produce enough income to make up for the cost of continued applications of pesticides.

The continued availability of Transform into October 2017 will provide relief for later Lygus infestations while allowing cotton's natural enemy complex to recover and stabilize.

SIGNIFICANT ECONOMIC LOSS (SEL)
(Criteria for determining SEL)

Cotton producers in California have experienced major Lygus infestations over the past 40 years. From National Agricultural Statistics Service (NASS) data, historical losses related to high Lygus populations are illustrated in the chart below. The large dips in yield for both Upland and Pima cotton can be directly related to Lygus infestations reported in the Beltwide Conference reports. In 1978 (before loss estimates were collected systematically), the yield dip was 37% below the 5 year average, even with the use of organochlorine and organophosphate insecticides. In 1995, Upland yield was reduced by 22% compared to 2 year running average and 16% reduction for Pima. In 1998, another large Lygus bug infestation occurred resulting in 29% yield reduction in Upland and 18% in Pima. These losses were direct yield reductions from lygus infestations and did not account for the additional costs of increased insecticide applications and additional costs incurred for extending the season to make-up for lost fruiting.



Decline in yield attributable to Lygus impact – Beltwide Proceedings reports

Experience has taught cotton growers that loss of fruit early cannot be completely compensated even in the best conditions. The growers will incur additional costs to extend the harvest, and from years where lygus caused significant early square and boll losses, growers have experienced the following:

- To attempt to make up for lost squares from Lygus feeding, a need to grow a larger plant for a longer duration is required. For most soil types, to obtain fully mature late-developing bolls, additional irrigation (typically in September) will be required in order to maintain acceptable plant water and nutrient uptake. Water costs vary widely between water districts, ranging from as low as $40/acre foot to over $200/acre foot. An average cost for a late irrigation might be about $60/acre for the water and $20/acre for the extra labor required.

- Cotton plants that have experienced damage done by Lygus earlier in the season will tend to be larger. As mentioned before, Lygus will feed on the growing tips of the plant causing the cotton plant to become bushy. In an attempt to retain and mature late-season bolls, the grower will allow the cotton plants to continue to grow. This extra, later growth typically results in plants that are more difficult and expensive to defoliate. Furthermore, during these circumstances of late harvesting, the defoliation process can be delayed and started during cooler weather periods. The larger plants and cooler weather will often require more expensive defoliant chemicals and additional applications for successful defoliation and desiccation of retained leaves. This is particularly true for Pima varieties, which even in more normal years are more difficult to successfully defoliate than Upland cotton. Extra costs for an additional defoliant application could be in the range of $25-$40/acre for chemicals and $15/acre for applications.

Furthermore, cotton fields being carried later to make-up yield loss will tend to have a large influx of late season pests, such as whitefly and aphids. Not only will the growers need to apply additional pesticides to control the late season pests, the growers will also have significant concerns over lint quality. Whiteflies are a major source for creating excess sugars found on the lint; as a result, the presence of white flies increases the risk for sticky cotton. After Arizona produced cotton with excess sugars in the 1990s, there were severe penalties imposed on the entire region. Because excess sugars are not measured in any standard way that translates directly to the risk of processing issues (i.e., jammed equipment), buyers simply stop buying altogether or give a reduced price to a region with a reputation for having produced sticky cotton. Having sticky cotton will add to further losses for the growers. There are no published schedules or lists of penalties associated with sticky cotton risk. Therefore, scientists relied on estimates based on prior episodes that have occurred in this region and are summarized in Ellsworth et al. (1999). It has been estimated that growers would receive an average price erosion of 6.14% or $0.0461/lb (derived from data in Ellsworth et al. 1999) for their sticky cotton. For an extended review of economic methodologies for estimating the impacts of sticky cotton on the price of cotton, consult Frisvold et al. (2007).

In previous years (1978, 1995, and 1998) when lygus impacted cotton yield significantly, the loss in yield occurred when average yield levels of California cotton producers generally ranged from about 1100 to as much as 1400 pounds of lint per acre. With lower production costs that prevailed in many years prior to the 2000's, that range of yields was still able to generate a profit for most cotton growers. However, during the past decade or more, the price received per pound for cotton (seed plus lint) has not increased to keep pace with increasing production and processing costs when calculated on a per acre basis.

Over the past 10-15 years, increases in irrigation, transgenic cotton seed development, harvest operations, labor, and fertilizer input costs all have been major drivers in increased production expenses. To cope with these cost increases and remain economically competitive with some other crop choices, growers have needed higher average yields to generate acceptable profit margins to stay in cotton production. Within the past 2-3 years, growers have related that in areas with more expensive irrigation water, they need as much as 1500 to 1600 lbs lint per acre or more to break even (Hutmacher, personal communications).

The cotton industry has collected extensive information in regard to factors impacting yield. The information collected in the Tier 1 SEL table is from the 2015-2017 Beltwide Cotton Conferences Insect Loss Reports and data provided by the California Cotton Ginners and Growers association. The table illustrates a drastic increase in cost for insecticide applications required for treating the current lygus infestations compared to routine years. There is a 227.9% increase in the cost of pesticide applications. Several growers will still need to make more applications as Lygus bugs move in from other crops and as late season pest populations develop.

For 2017, the increased acreage is the result of water conditions and availability. A large majority of cotton produced in California is done so under the Federal Water Project, South of Delta. This year's allocation was 100%, thus the growers were able to increase the planted acreage. Below illustrates the availability of water over the last six years. While water availability accounts for about 80-90% of the increased acreage, the other factor is from competing commodity prices.

South of Delta FWP Allocations
2017 – 100%
2016 – 5%
2015 – 0%
2014 – 0%
2013 – 20%
2012 – 40%

At the beginning of the growing season, the cotton industry estimates the average yield per acre. Based on successful breeding programs, the cotton industry originally predicted for a slight increase in yield for the 2017 season, 1725 pounds per acre. The predicted 2017 yield when compared to the three year average, 1,634 pounds per acre, appears to have a 5.6% increase. Although the prediction in yield appears to be greater than the last three years, the estimate does not account for Lygus damage the growers will incur for the 2017 growing season. Based on historical Lygus events, a conservative estimate in loss of 22% has been predicted for the 2017 growing season. In the past, cotton growers have experienced far greater loss of yield with similar Lygus pressure.

Tier 1 Yield Loss Due to Lygus in Cotton

Year	Cotton Acreage	% acreage treated for lygus	Ave. No. applications targeting lygus	Ave Cost per application	Total Cost	% Yield Loss	Average yield (Pounds per acre)
2014	210,400	84,160	1.0	$16.50	$16.50	1.0%	1690
2015	162,000	100,000	2.5	$18.00	$45.00	1.0%	1594
2016	218,977	131,886	2.0	$15.00	$30.00	2.0%	1618
Averages	**197,126**	**105,349**	**1.8**	**$16.50**	**$30.50**	**1.3%**	**1,634**
2017	296,000	266,400	4.0	$25.00	$100.00	22.0%*	1725**
% Change (3 yr. average vs. 2017)	50.2% Increase	152.9% Increase	118.2% Increase	51.5% Increase	227.9% Increase	1570.9% Increase	5.6% Increase

*Percent Yield loss is conservatively predicted from historical losses relating to Lygus infestations.

**2017 Average yield (ponds per acre) is an industry estimation made at the beginning of the season and does not account for Lygus damage.

FOOD QUALITY PROTECTION ACT OF1996

(Use separate attachment if necessary)

1. **Environmental Fate:** Sulfoxaflor has a relatively short environmental half-life. Residues are unlikely to be found in soil following application. The rapid soil degradation of sulfoxaflor reduces the likelihood that it will be available for transport to water or sediment via runoff. Soil dissipation/accumulation of sulfoxaflor under North American (United States and Canada) field conditions was conducted in bare plots and cropped plots at 5 sites. No sulfoxaflor soil residues greater than the analytical method LOQ (0.001 ppm) were determined below the top eighteen (18) inches of soil at any time during the study. At the California test site, no residues of sulfoxaflor were determined in any soil-pore water samples collected from all lysimeter depths (3, 6, and 9 ft) during the entire study. Sulfoxaflor residues are unlikely to be found in ground or surface water following application to crops.

2. **Residential Use:** There are currently no residential uses of sulfoxaflor.

3. **Mode of Action:** Sulfoxaflor is the first member of a new class of insecticides, the sulfoximines. Sulfoxaflor consists of two diastereomers in a ratio of approximately 50:50 with each diastereomer consisting of two enantiomers. Sulfoxaflor is systemically distributed in plants when applied. The chemical acts through both contact action and ingestion and provides both rapid knockdown (symptoms are typically observed within 1-2 hours of application) and residual control (generally provides from 7 to 21 days of residual control). The sulfoximines are a novel class of insecticides which act through a unique interaction with the nicotinic acetylcholine receptor in insects. Sulfoxaflor is a highly efficacious agonist of the nicotinic receptor. Furthermore, the structural novelty of sulfoxaflor makes it stable in the presence of monooxygenase enzymes that degrade neonicotinoids and cause virtually all known cases of resistance in the field of that class of insecticides. All of these factors contribute to the broad lack of cross-resistance to existing insecticide chemistries. Sulfoxaflor has its own unique Insect Resistance Action Committee (IRAC) classification (4C).

4. **Harvest Season:** Harvested is anticipated to begin in October of 2017.

DISCUSSION OF ANTICIPATED RISKS TO ENDANGERED OR THREATENED SPECIES, BENEFICIAL ORGANISMS, OR THE ENVIRONMENT

The toxicity of sulfoxaflor to fish and wildlife has been reviewed by DPR, and the results of this review are noted in the attached Evaluation Report Memorandum (**Attachment E**).

DPR has evaluated pesticide exposure to endangered species habitats in California, classifying risk and developing protection strategies to minimize risk as needed. DPR coordinates endangered species protection strategies with the Department of Fish and Wildlife, the Department of Food and Agriculture, the County Agricultural Commissioners, and U.S. EPA in accordance with a state plan. Mitigation measures have been put in place and can be found at http://www.cdpr.ca.gov/docs/endspec/index.htm.

The Section 18 Use Instructions will contain the following language and recommendations to avoid exposures to any listed species.

"Use of this product may pose a hazard to endangered or threatened species. Before applying this product, applicators must obtain information regarding the proximity of endangered species habitats and follow any applicable use limitations. Contact your County Agricultural Commissioner or refer to the Department of Pesticide Regulation's PRESCRIBE Internet Database: http://www.cdpr.ca.gov/docs/endspec/prescint.htm for details."

In addition, the Transform WG product label bears language to mitigate environmental hazards and outlines the precautions to follow when it is used near an aquatic environment.

ATTACHMENTS

A. Proposed DRAFT Section 18 Use Instructions.
B. U.S. Environmental Protection Agency (EPA) Section 3 Stamped-Accepted label for Transform WG Insecticide.
C. Ghazanfari, Jamshid. *Pest and Disease Protection Evaluation Memorandum*. California Department of Pesticide Regulation. July 12, 2017.
D. Brian, Bret. Letter of Support. Dow AgroSciences LLC. June 26, 2017.
E. Bireley, Richard and Tafarella, Brigitte. *Ecotoxicology Evaluation Memorandum*. California Department of Pesticide Regulation. July 19, 2017.

REFERENCES

Anon. 2015. An Areawide Pest Management Strategic Plan for Safflower Production in the Southern San Joaquin Valley of California. https://ipmdata.ipmcenters.org/documents/pmsps/CASafflowerPMSP2016.pdf

Godfrey, LD, P. B. Goodell, E. T. Natwick, D. R. Haviland, V. M. Barlow. 2015. Insects and Mites. In: UC IPM Pest Management Guidelines: Cotton. UC ANR Publication 3444. On-line: http://ipm.ucanr.edu/PMG/selectnewpest.cotton.html.

Goodell, PB, K Lynn-Patterson, and Johnson, R. 2012. Can surrounding landscapes be predictive of in-field pest infestations? CAPCA Adviser, April 2012 pp20-24.

Carriere Y, Goodell PB, Ellers-Kirk C, Larocque G, Dutilleul P, et al. 2012. Effects of local and landscape factors on population dynamics of a cotton pest. PLoS ONE 7(6): e39862. doi:10.1371/journal.pone.0039862

Johnson Hake, S. et al. 1996. Cotton Production Manual. UC ANR Cotton Production Manual. UC ANR Publication 3352.

Texas A&M AgriLife Extension:
http://cottonbugs.tamu.edu/fruit-feeding-pests/lygus-bugs/

UC IPM Website:
http://ipm.ucanr.edu/PMG/r114301611.html